Application No.: 10/763,277
Amendment Under 37 C.F.R. §1.111 dated August 20, 2004
Response to the Office Action of May 21, 2004

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Original): An optical switch for switching a transmission path in a waveguide in accordance with a change in refractive index made by carrier injection, wherein a carrier-accumulating layer in which the injected carriers are accumulated is provided on a semiconductor substrate having the waveguide formed thereon.

Claim 2 (Original): The optical switch as claimed in claim 1, wherein a clad layer and a waveguide layer are stacked on the semiconductor substrate, and the clad layer has a band gap broader than that of the waveguide layer, thereby causing the waveguide layer to be the carrier-accumulating layer.

Claim 3 (Original): The optical switch as claimed in claim 1 or 2, wherein a semiconductor layer having a broader band gap than that of a waveguide layer is provided on the waveguide layer.

Claim 4 (Currently Amended): The optical switch as claimed in claim 3, wherein ~~a~~ the semiconductor layer having a broader band gap than that of ~~a~~ the waveguide layer ~~is provided on the waveguide layer and~~ is formed by a layer having different p/n polarity.

Claim 5 (Previously Presented): The optical switch as claimed in claim 1 or 2, wherein the waveguide layer is made of an n-type semiconductor.

Claim 6 (Currently Amended): The optical switch as claimed in claim ~~1 or~~ 2, wherein the waveguide layer is formed by a semiconductor layer having a narrower band gap than that of the clad layer and is formed by a layer having a different polarity.

Claim 7 (Previously Presented): The optical switch as claimed in claim 1 or 2, wherein on a semi-insulating GaAs substrate, p-AlGaAs is stacked as a clad layer, and n-AlGaAs having a lower Al content ratio (including 0) than the clad layer is stacked as a waveguide layer.

Claim 8 (Previously Presented): The optical switch as claimed in claim 1 or 2, wherein a SiGe-based material is used as a semiconductor material.

Claim 9 (Previously Presented): The optical switch as claimed in claim 1 or 2, wherein an InGa(Al)AsP-based material is used as a semiconductor material.

Claim 10 (Previously Presented): The optical switch as claimed in claim 1 or 2, wherein a GaInNAs-based material is used as a semiconductor material.

Claim 11 (Original): An optical switch for switching a transmission path of an optical signal in accordance with a change in refractive index due to carrier injection, comprising:

a first clad layer formed on a semiconductor substrate;

a waveguide layer formed on the first clad layer and having a waveguide formed therein in which the optical signal enters from one side, the optical path splits into two at an intermediate part, and the signal is emitted;

a second clad layer formed on the waveguide layer;

a contact layer formed on the second clad layer;

an oxide layer formed thereon on the first clad layer and on the contact layer except for a part thereof;

a first electrode formed on the part on the contact layer where the oxide layer is not formed;

a second electrode formed on the rear side of the substrate; and

an impurity diffusion region for current narrowing in the second clad layer right below the first electrode and in all parts of the first clad layer except for the part right below the first electrode;

wherein a third clad layer is formed on the first clad layer.

Claim 12 (Original): The optical switch as claimed in claim 11, wherein the waveguide is made of a slab type.

Claim 13 (Original): The optical switch as claimed in claim 11 or 12, wherein the third clad layer is formed with such a low carrier concentration that free carrier absorption does not occur.